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DAIRY WASTE TREATMENT AT THE PENNSYLVANIA STATE COLLEGE

Progress Report

Eastern Regional Research Laboratory
Bureau of Agricultural and Industrial Chemistry
Agricultural Research Administration
U. S. Department of Agriculture

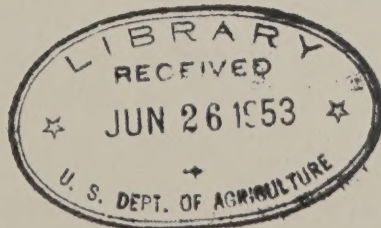
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Historical. The project was begun on approximately April 1, 1952, upon the signing and receipt of research contract A-ls-33457 by the Department of Engineering Research at The Pennsylvania State College. Studies of creamery waste flow, general planning, and recruitment of staff were the major activities in April and May. A graduate research assistant was obtained in June and plans were drawn, equipment ordered, and initial phases of construction completed by September 15. At this time the pilot plant was erected but some essential parts were not delivered until December 18 because of the steel strike. In the meantime the various control systems for air, pumping waste and effluent, oxidation-reduction (ORP) recording, and temperature control were installed. The pilot plant was then completed and, after hydraulic tests were made, the first waste was run in on January 13, 1953.

Location. The pilot plant is located out of doors just beside the college creamery in a fenced, court area. The waste is pumped to the tank from a sump in the basement of the creamery building. The Dairy Manufactures Division of the college has assigned an excellent laboratory room just inside the creamery building to the project. The recording and controlling equipment are located there. Other laboratory space is available in the Civil Engineering Building, about one-half mile away.

Pilot plant units. The aeration tank is wooden, of 19,000-gallon capacity, and equipped with 8 Venturi-type injectors to admix air and waste (for the first phases of the study). There are two 125-cfm displacement blowers, two 50-gpm raw waste pumps, and a 250-gpm recirculation pump. As indicated above, control and recording equipment for all important operating variables are installed. A new method for measuring the efficiency of O₂ uptake in the aerator has been developed in the Eastern Regional Research Laboratory for this project. The equipment has been sent to State College but it has not yet been incorporated in the study.

Operating results. The plant was originally started without inoculation, attempting to build up a microflora from the organisms naturally present in the sewers of the dairy plant. The culture developed slowly, and later results have shown that the return sludge from a municipal activated sludge plant produces an effective culture much more quickly. Reductions in



chemical oxygen demand (COD) and lactose of 80-90% were obtained, but results were not consistent due to erratic schedules in dumping cheese whey. A severe foaming occurred, a problem not observed in previous laboratory studies. The sewers were modified to exclude the whey so that the planned studies on milk plant waste (without whey) could be carried out. Later, the oxidation of waste containing various quantities of whey will be studied. Chemical study of the foam indicated that it was a mucilaginous, stable product which contained about one-third protein and considerable amounts of "dextrins", or polysaccharides. Attempts to control this foam by water spray or kerosene were not successful. Silicone antifoam has been recommended by dairy industry sanitary engineers if such trouble occurs again. The use of minimal quantities of air to control foaming also has been suggested. The plant appears to be in balanced operation now and tests of operating variables will be continued. The pilot plant results to date were reported at the 8th Industrial Waste Conference at Purdue University on May 4, 1953.

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